
Quantitative fluorescence tomography with functional and structural a priori information.

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Public Summary:

Scientific Abstract:

We demonstrate the necessity of functional and structural a priori information for quantitative fluorescence tomography (FT) with phantom studies. Here the functional a priori information is defined as the optical properties of the heterogeneous background that can be measured by a diffuse optical tomography (DOT) system. A CCD-based noncontact hybrid FT/DOT system that could take measurements at multiple views was built. Multimodality phantoms with multiple compartments were constructed and used in the experiments to mimic a heterogeneous optical background. A 3.6 mm diameter object deeply embedded in a heterogeneous optical background could be localized without any a priori information, but the recovered fluorophore concentration only reached one tenth of the true concentration. On the other hand, the true fluorophore concentration could be recovered when both functional and structural a priori information is utilized to guide and constrain the FT reconstruction algorithm.

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